E.O. Lawrence Berkeley National Laboratory
University of California
Environmental Restoration Program

United States Department of Energy

REQUEST FOR NO FURTHER INVESTIGATION (NFI) STATUS FOR THE BUILDING 51 MOTOR GENERATOR ROOM SUMP (SOLID WASTE MANAGEMENT UNIT 9-6)

for the

Lawrence Berkeley National Laboratory

ENVIRONMENTAL RESTORATION PROGRAM

September 1999

REQUEST FOR
NO FURTHER INVESTIGATION (NFI) STATUS
FOR
THE BUILDING 51 MOTOR GENERATOR ROOM SUMP
(SOLID WASTE MANAGEMENT UNIT 9-6)

for the

Lawrence Berkeley National Laboratory

ENVIRONMENTAL RESTORATION PROGRAM

A Joint Effort of
Environment, Health and Safety Division and
Earth Sciences Division
Lawrence Berkeley National Laboratory
University of California
Berkeley, CA 94720

and

Parsons Engineering Science, Inc.
Oakland, California

September 1999

This work was done at the Lawrence Berkeley Laboratory operated by the University of California for the U. S. Department of Energy under contract DE-AC03-76SF00098.

CONTENTS

LIST OF ABBREVIATIONS

AOC	Area of Concern
Berkeley Lab	Lawrence Berkeley National Laboratory
CAL-EPA	California Environmental Protection Agency
CAP	Corrective Action Program
CMS	Corrective Measures Studies
DTSC	Cal-EPA Department of Toxic Substances Control
EBMUD	Eat Bay Municipal Utility District
ERP	Environmental Restoration Program
mg/kg	milligrams per kilogram
µg/L	micrograms per liter (10^{-6} grams per liter)
NFI	No Further Investigation
NFA	No Further Action
PCB	polychlorinated biphenyl
PRG	Preliminary Remediation Goal
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SVOCs	semi-volatile organic compounds
SWMU	Solid Waste Management Unit
TPH-D	Total Petroleum Hydrocarbons-Diesel
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds

SECTION 1

INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this report is to request approval of No Further Investigation (NFI) status for the Building 51 Motor Generator Room Sump (Solid Waste Management Unit [SWMU] 9-6), under the Resource Conservation Recovery Act (RCRA) Corrective Action Program (CAP) at Lawrence Berkeley National Laboratory (Berkeley Lab). The California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) is the lead regulatory agency for the CAP and has the authority to approve NFI status for this unit. If NFI status is approved, no additional sampling would be required and the unit would be included in the site-wide risk assessment. The location of the Building 51 Motor Generator Room Sump is shown on Figure 1 and Figure 2. The Motor Generator Room Sump is connected to the Building 51 Drainage System (Area of Concern [AOC] 9-9). A separate NFI request will be submitted for AOC 9-9 after investigations of the drainage system have been completed.

1.2 ENVIRONMENTAL INVESTIGATIONS

As part of its RCRA Facility Investigation (RFI), the Berkeley Lab Environmental Restoration Program (ERP) collects soil samples for chemical analysis at SWMUs and Areas of Concern (AOCs) identified during the RCRA Facility Assessment (RFA) (Berkeley Lab, 1992a) as having a potential for a past release to the environment. The purpose of this sampling is to evaluate whether a chemical release has actually occurred and, if so, to characterize the magnitude and extent of contamination. Monitoring wells are also installed and groundwater samples collected to assess whether groundwater has been impacted. Samples are collected in accordance with requirements specified in the RCRA Facility Investigation (RFI) Work Plan (Berkeley Lab, 1992b) and in subsequent RFI Work Plan addenda.

1.3 SCREENING PROCESS FOR NO FURTHER ACTION (NFA) OR NO FURTHER INVESTIGATION (NFI) STATUS

After sampling has been completed to determine whether a release has occurred at a SWMU or AOC and the magnitude and extent of any contamination have been determined, the unit is screened in accordance with the DTSC approved procedure described in the following paragraphs. The purpose of the screening is to determine whether the unit should be recommended for either No Further Action (NFA) or No Further Investigation (NFI) status.

The first step in the screening process is to compare the detected concentrations of analytes to background levels. The second step is to compare concentrations above background levels to United States Environmental Protection Agency (USEPA) Region IX and Cal-modified Preliminary Remediation Goals (PRGs) (USEPA, 1998) for residential soil.

Background Levels

Soil analysis data are compared to background levels to determine if contamination is present as the result of past site activities. For compounds that are not naturally occurring, such as most organic compounds, any detection is assumed to be contamination, unless another source, such as laboratory contamination, can be verified. For naturally occurring analytes such as metals, detected concentrations are compared to statistically derived background levels to identify with a certain degree of confidence which constituents are present at concentrations that represent contamination. Berkeley Lab has used the 95% upper tolerance limit method (USEPA, 1989) to estimate background concentrations of metals in soil (Berkeley Lab, 1995).

Preliminary Remediation Goals (PRGs)

Concentrations of analytes detected above background levels are then compared to USEPA Region IX PRGs (USEPA, 1998) or Cal-Modified PRGs for residential soil, where Region IX PRGs either have not been established, or are greater than the Cal-modified values. To implement a conservative approach to site screening, Berkeley Lab uses PRGs established for residential soils instead of less-stringent PRGs for soil at industrial sites.

Where concentrations of contaminants in soil are within Berkeley Lab background levels or below PRGs for residential soil, the SWMU or AOC is recommended for NFA status. Where concentrations of contaminants in soil are above both Berkeley Lab background levels and PRGs for residential soil, the SWMU or AOC is recommended for NFI status. No further site characterization will be required by DTSC for SWMUs and AOCs approved for either NFA or NFI status. SWMUs and AOCs approved for NFI status will be included in the risk assessment to be conducted as part of the Corrective Measures Studies (CMS) phase of the CAP. SWMUs and AOCs that are approved for NFA status will not be included in the CMS.

SECTION 2

DESCRIPTION OF BUILDING 51 MOTOR GENERATOR ROOM SUMP

2.1 SITE DESCRIPTION AND HISTORY

The Motor Generator Room Sump (Filter Sump) (SWMU 9-6) was installed in the 1950's, when Building 51 (the Bevatron) was built. The sump is constructed of 2 ½-foot square concrete walls to a depth of 5.3 feet below the basement floor surface. The base of the sump consists of an upper 3-inch thick and a lower 6-inch thick concrete slab, separated by 1-inch thick plywood. The base of the bottom concrete slab is 6.1 feet below the floor surface.

A network of subdrains and relief wells located around the perimeter of Building 51 collects subsurface water from the adjacent hillside. These subdrains are connected to the Building 51 internal floor drain system (AOC 9-9). The Filter Sump at the south end of the motor generator room basement is a collection point for part of the exterior relief well/subdrain system (J Line and K Line). The water in the Filter Sump is routed by gravity flow via the E Line, B Line, and A Line (cast iron drainage lines) to the Discharge Sump at the northern end of the building. The layout of the Filter Sump and the portion of the drainage system below the motor generator room basement are shown on Figure 2.

When the system was connected to the storm drain system, effluent from the Discharge Sump discharged to North Fork Strawberry Creek. Since 1962, except for a period between 1994 and 1996 when contaminants were not detected, the water from the Discharge Sump has been routed to the sanitary sewer. Currently, the effluent from the Discharge Sump is treated and discharged to the sanitary sewer under Berkeley Lab's East Bay Municipal Utility District (EBMUD) discharge permit.

On November 12, 1990, water in the Filter Sump cover was observed to be coated with black oil that contained polychlorinated biphenyls (PCBs). The oil originated from blown

capacitors that were being stored in the room. A survey of the drain lines conducted at that time indicated that the northern portion of the drainage system was contaminated with oil containing PCBs. The system was flushed, and the discharged material was containerized for disposal.

In June 1999, approximately 4 inches of sludge were removed from the bottom of the Filter Sump and the sump was steam cleaned.

2.2 CHEMICALS OF POTENTIAL CONCERN

The sump was not intended to handle waste. However, capacitor oil containing PCBs spilled and entered the sump. In addition, industrial solvents that were used for cleaning the floor may have entered the sump. Mercury is also a chemical of potential concern for this sump.

2.3 GEOLOGY AND HYDROGEOLOGY

A map of the surficial geology in the area of the Filter Sump is shown on Figure 3. Artificial fill was generally encountered to a depth between 5.5 and 6.5 feet in the borings drilled within approximately 3 feet of the sump, which is approximately the depth of the base of the sump. Bedrock was encountered immediately beneath the basement floor subbase (approximately 1.2 feet below the floor surface) in the other borings drilled for investigation of the sump. South of the sump, the artificial fill consists of loose, silty andesitic gravel that is probably derived from the Moraga Formation. North of the sump, the artificial fill consists of medium stiff gravelly clay. This fill contains gravels primarily of red-brown and blue-gray siltstone and sandstone and therefore appears to be derived from the Orinda Formation. The Orinda Formation bedrock near the sump consists of interbedded claystone and siltstone with very low permeability. The rock was generally crushed to intensely fractured, friable to weak, of low hardness, and little weathered. Based on results of slug tests conducted in monitoring wells, the Orinda Formation has a hydraulic conductivity of 10^{-7} to 10^{-9} m/s.

Below a depth of approximately 4 feet, the material encountered in the borings appeared to be saturated, although no water was encountered in the borings when they were drilled. This is approximately the same depth as the outlet pipe (E Line) from the Filter Sump. After the Filter

Sump was cleaned in June 1999, the inlet to the sump was sealed and the standing water was pumped from the sump. The water level in the sump subsequently rose to the elevation of the outlet pipe, approximately 9 inches above the bottom of the sump (approximately 4.25 feet below the floor). Based on these results, the outlet from the sump appears to be controlling the groundwater elevation in the area of the sump.

SECTION 3

ENVIRONMENTAL INVESTIGATIONS

3.1 SUMMARY OF INVESTIGATIONS

Environmental investigations at the Filter Sump consisted of analyzing sediment samples collected from the sump, analyzing soil samples collected from borings near the sump, and analyzing groundwater samples collected from a temporary sampling point adjacent to the sump and from water flowing from the drainage line into the sump. The locations of the soil borings and the temporary groundwater sampling point (SB51-96-6) are shown on Figure 4. Samples have been analyzed for volatile organic compounds (VOCs), PCBs, Fuels, Oil & Grease, semi volatile organic compounds (SVOCs), and metals. Analytical results for samples collected during the RFI are included in the following tables:

Table Numbers for Analytical Results

	Analysis					
Media	**VOCs**	**PCBs**	**Fuels**	**Oil & Grease**	**SVOCs**	**Metals**
Soil	1a	1a	1a	1a		1b
Sediment in Filter Sump	2a	2b	2b	1a	2b	2b
Groundwater (SB51-96-6)	3	3		1a		
Water in Filter Sump		3				

3.2 SEDIMENT AND WATER SAMPLES FROM THE FILTER SUMP

In November 1990, water, oil, and sludge samples were collected from the Filter Sump. PCBs were detected at maximum concentrations of 110 µg/L (water), 110 mg/kg (oil), and 3,700 mg/kg (sludge). As was discussed previously, this sludge was removed during cleanup activities.

In April 1996, a sediment sample was collected from the Filter Sump (SS-51-MR-FS-1,2). The sample was analyzed for Total Petroleum Hydrocarbon as Diesel (TPH-D), oil &

grease, PCBs, and mercury. PCBs (380 mg/kg Aroclor-1242), oil & grease (45,000 mg/kg), and mercury (105 mg/kg) were detected in sediment in the Filter Sump. In May 1999, a second sediment sample was collected from the Filter Sump. The sample was analyzed for SVOCs, PCBs, fuels, and metals. PCBs (330 mg/kg Aroclor-1242), hydraulic/motor oil (45,000 mg/kg), and low concentrations of SVOCs (bis(2-ethylhexyl)phthalate = 13 mg/kg, fluoranthene = 3.9 mg/kg, and pyrene = 3.9 mg/kg) were detected. Mercury (46 mg/kg) and lead (130 mg/kg), and chromium (305 mg/kg) were also detected in the sediment. As was discussed previously, this sludge was also removed.

Water samples were collected from the Filter Sump in April 1999 and from the inflow (K-Line) to the Filter Sump in May 1999 and analyzed for PCBs. PCBs (Aroclor 1242) were detected at concentrations of 3600 μg/L and 3.4 μg/L, respectively.

3.3 SOIL SAMPLES FROM BORINGS

In April 1996, soil boring SB51-96-6 was drilled adjacent to the Filter Sump. Soil samples were collected at 4 and 7 feet below the floor surface. No VOCs were detected. Oil & grease (170 mg/kg) and motor oil (210 mg/kg maximum) were detected. PCBs (Aroclor 1242) were detected at 7 feet (1.8 mg/kg). Chromium (260 mg/kg) and nickel (160 mg/kg) were detected at concentrations above the PRGs for residential soil and Berkeley Lab background levels.

Also in April 1996, five soil borings were drilled along the drainage lines, including SB51-96-10 approximately 8 feet from the Filter Sump. Soil samples were collected at 4 and 6 feet below floor surface in SB51-96-10. No PCBs, fuels, oil & grease or VOCs were detected. Metals were detected at a concentration within Berkeley Lab background levels or below the PRG for residential soil.

In June 1999, in response to a request from the DTSC, nine 15-foot deep borings were drilled inside, and on approximately 3-foot centers outside, the Motor Generator Room Filter Sump. Forty-four soil samples were collected and analyzed for PCBs, VOCs, metals, fuels, and oil & grease. Oil and grease was not detected. Crude/waste oil (57 mg/kg maximum) was detected in two samples. No other fuels were detected. PCBs (Aroclor 1242) were detected in five in-place samples (0.16

mg/kg maximum concentration) and in a sample of slough (material that fell to the bottom of the boring) at the sump (3.3 mg/kg). Low concentrations of VOCs (0.06 mg/kg maximum) were also detected in eight samples. Except for nickel in three samples, concentrations of metals detected were below Berkeley Lab background levels or PRGs for residential soil.

Results of the investigations are shown on Figure 5 through Figure 9. Figures 5a and 5b show concentrations of PCBs detected at different depths on cross sections AA' and BB'. The locations of the cross sections are shown on Figure 3. The maximum concentration of PCBs detected in *in-situ* soil (0.16 mg/kg), excluding a sample of slough, was found in a sample collected approximately 1 foot below the base of the Filter Sump. PCBs were not detected in the two deeper samples collected at the same location (approximately 4 feet and 7 feet beneath the base of the sump).

Figure 6a and 6b show concentrations of VOCs detected in soil samples on the same two cross sections. The maximum concentration of TCE detected in soil samples (0.061 mg/kg) was found approximately 1 foot from the Filter Sump in the Moraga Formation derived fill material. Concentrations of VOCs detected were all well below their PRG for residential soil.

Concentrations of fuels detected in soil samples are shown on the same two cross sections on Figure 7a and 7b. Metals detected at concentrations above background and PRGs for residential soil are shown on Figure 8a and 8b. Nickel was the only metal detected in the recent samples collected in June 1999 at a concentration above the Berkeley lab background level and the PRG for residential soil. Three of the recent samples collected from the Orinda Formation bedrock showed nickel at a concentration slightly above the statistically determined background level. Recent evaluation of the Orinda Formation sample population indicated that concentrations of nickel in the range of 100 mg/kg to 200 mg/kg are within background levels.

3.4 GROUNDWATER SAMPLES FROM TEMPORARY SAMPLING POINTS

Soil borings SB51-96-6 was converted to a temporary groundwater sampling point to permit collection of groundwater samples. Grab water samples were collected in 1996 (5

samples) and 1997 and analyzed for VOCs, PCBs, or oil & grease. No PCBs or oil & grease were detected. VOCs (primarily trichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene) were detected at a total concentration of 113 μg/L in April 1996. No VOCs were detected in the sample collected in November 1996 and only low concentrations (8.7 μg/L total) were detected in December 1997. SB51-96-6 has been dry because of the dewatering operations in the basement, and therefore not been sampled recently.

3.5 MIGRATION OF CONTAMINANTS

Analysis of contents of the Filter Sump has shown the presence of PCBs, metals, and fuels in the past. The building 51 drainage system was designed such that under normal conditions, groundwater flowing into the sump discharges through the cast iron subdrain to the Discharge Sump, located at the north end of the basement. As noted previously, since 1962 the water from the Discharge Sump was pumped to the sanitary sewer system. Occasionally, however, the pump in the Discharge Sump required repair. While the pump was being repaired, the water table rose in the basement. When the water table rose, contaminants in the cast iron subdrain were forced up into the connected terra cotta drain pipe and from there through the openings in the terra cotta pipe into the fill material next to the pipe. Penetration of the contaminants into the Orinda formation bedrock was limited due to its very low permeability. During these short periods, a limited amount of contamination may also have penetrated through the concrete walls and floor of the Filter Sump into the fill material adjacent to the sump. This would explain the low concentrations of PCBs, VOCs, and fuels detected in the fill material next to the sump.

SECTION 4

INTERIM CORRECTIVE MEASURES

In June 1999, the sediment was removed from the Filter Sump and the walls and floor of the sump were cleaned with a high pressure water jet and steam. Furthermore, in response to a request from the DTSC, Enviroact (Roto Rooter) was retained in August 1999 to clean the cast iron subdrain between the Filter Sump and Discharge Sump. High pressure water was used to dislodge the remaining oil from inside the pipe. A subsequent video survey of the pipe indicated no remaining oil contamination. The wastewater was collected with the help of a vacuum truck. A photograph of the water jet and vacuum trucks during the cleaning operation is shown in Exhibit 1. More than 2000 gallons of the collected wastewater was stored in a 4000-gallon tank, which is shown in Exhibit 2. Analysis of the wastewater in the tank showed hydraulic/motor oil (11,000 μg/L); PCBs 1242 (52 μg/L); benzo(a)anthracene (28 μg/L); chrysene (23 μg/L); fluorene (50 μg/L); pyrene (62 μg/L); chloroform from city water (7.2 μg/L); and trace amount (less than 1 μg/L) of TCE. The sediment was also removed from the Discharge Sump. As was discussed previously, the source of the PCBs released to the fill material next to the cast iron subdrain was identified and the contaminated materials were removed. The fill material next to the Discharge Sump is also being excavated.

SECTION 5

RATIONALE FOR NFI RECOMMENDATION

The building 51 Motor Generator Room Sump (SWMU 9-6) is recommended for No Further Investigation status for the following reasons:

1. A close sampling pattern consisting of a 3-foot horizontal grid and 3-foot vertical interval was established in the accessible area around the Filter Sump to assess the magnitude and extent of soil contamination. The sampling was conducted in accordance with a work plan that was prepared in consultation with DTSC (Berkeley Lab, 1999). Results of this investigation were presented in Section 3.3. As was noted on the cross sections, the soil contamination was limited primarily to the area within approximately 3 feet horizontally from the sump and 5 feet below the bottom of the sump. The extent of contamination in the environment adjacent to the Filter Sump has been determined in accordance with requirements specified in the workplan approved by DTSC (Berkeley Lab, 1999).

2. Maximum concentrations of analytes detected in soil samples are listed in Table 4 together with PRGs for residential soil and Berkeley Lab maximum background levels (Berkeley Lab, 1995). Although PCBs were not detected at a concentration above the PRG in the 43 *in-situ* soil samples collected in accordance with the June 1999 sampling plan (Berkeley Lab, 1999), a soil sample collected in 1996 contained PCBs at a concentration of 1.8 mg/kg, which was above the PRG (0.2 mg/kg). A sample of slough material collected from the boring beneath the Filter Sump during the June 1999 sampling contained PCBs at a concentration of 3.3 mg/kg, which was also above the PRG. No other organic analyte was detected at a concentration above the PRG for residential soil. Chromium (1 of 46 samples) and nickel (4 of 46 samples) were the only metals detected above both PRGs for residential soil and Berkeley Lab background levels. Concentrations of nickel are shown on the north-

south (Figure 9a) and east west (Figure 9b) cross sections. As can be seen on these figures, the variations in nickel concentration appear to be random and there is no indication that the higher nickel concentrations are the result of contamination from a source such as the sump. The higher nickel concentrations were detected in the Orinda Formation and the Orinda Formation derived fill. The Orinda Formation has higher background nickel levels than the other geologic formations at Berkeley Lab (Berkeley Lab, 1995). The above information corroborates that the magnitude of contamination in the soil has been characterized.

3. As suggested by the DTSC, the Filter Sump and the associated drainage system between the Filter Sump and the Discharge Sump at the north end of the building have been cleaned.

Because of the detection of PCBs at concentrations above the PRG for residential soil, and nickel and chromium above background levels and PRGs for residential soil, the Building 51 Motor Generator Room Sump (SWMU 9-6) will be included in the site-wide risk assessment.

SECTION 6

REFERENCES

Berkeley Lab (1992a). *RCRA Facility Investigation Work Plan for the Environmental Restoration Program, Lawrence Berkeley Laboratory.* Lawrence Berkeley Laboratory, Berkeley, California. October 30, 1992.

Berkeley Lab (1992b). *RCRA Facility Assessment (RFA).* Lawrence Berkeley Laboratory Environmental Restoration Program. September 30, 1992.

Berkeley Lab (1995). *Protocol for Determining Background Concentrations of Metals in Soil at Lawrence Berkeley National Laboratory (Berkeley Lab).* Environmental Restoration Program, Lawrence Berkeley National Laboratory. August 1995.

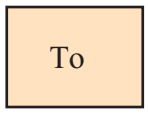
Berkeley Lab (1999). *Workplan for Soil Investigations at the Building 51 Motor Generator Room Filter Sump (SWMU 9-6).* Environmental Restoration Program, Lawrence Berkeley National Laboratory. June 1999.

USEPA (1989). *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities.* Interim Final Guidance, United States Environmental Protection Agency. Publication number PB89-151047. February 1989.

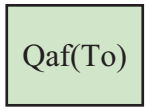
USEPA (1998). *Region 9 Preliminary Remediation Goals (PRGs) 1998.* USEPA Region IX.

LIST OF FIGURES

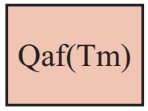
EXPLANATION



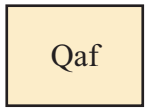
Orinda Formation



Artiificial fill
Gravelly clay derived from the Orinda Formation.



Artifical fill
Andesite gravels derived from Moraga Formation.



Artifical fill

Contact dashed where approximately located.

Cross section location

Soil boring

T

Temporary groundwater sampling point

Cast iron drainage line (with segment)

Rock and tile drain (terra cotta)

ND

Not Detected

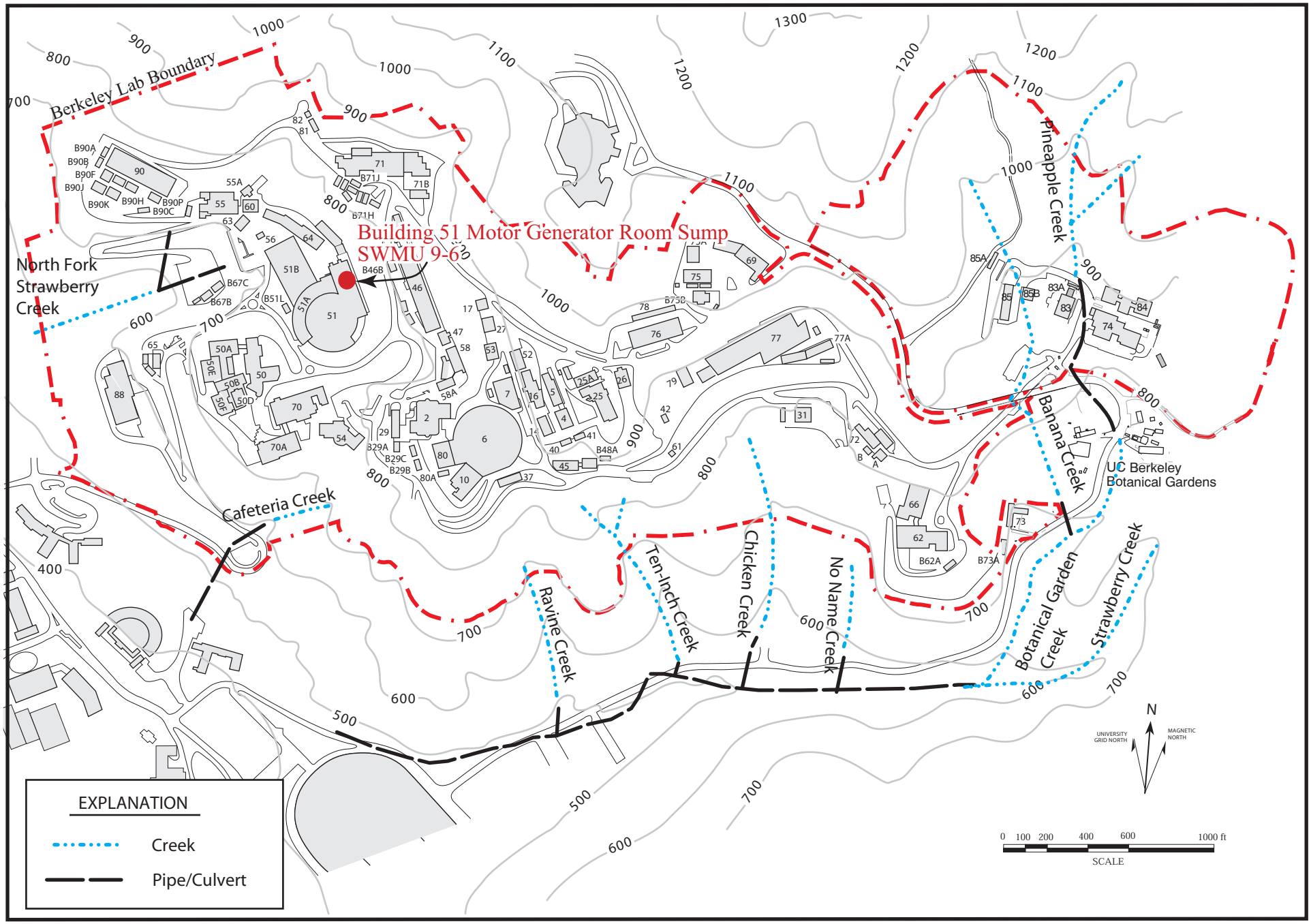
<0.01

Not detected (less than 0.01 mg/kg)

Groundwater level

Soil boring

Soil sampling location



1-FSloc.ai
7/99

Figure 1. Location of Buiding 51 Motor Generator Room Sump (SWMU 9-6)

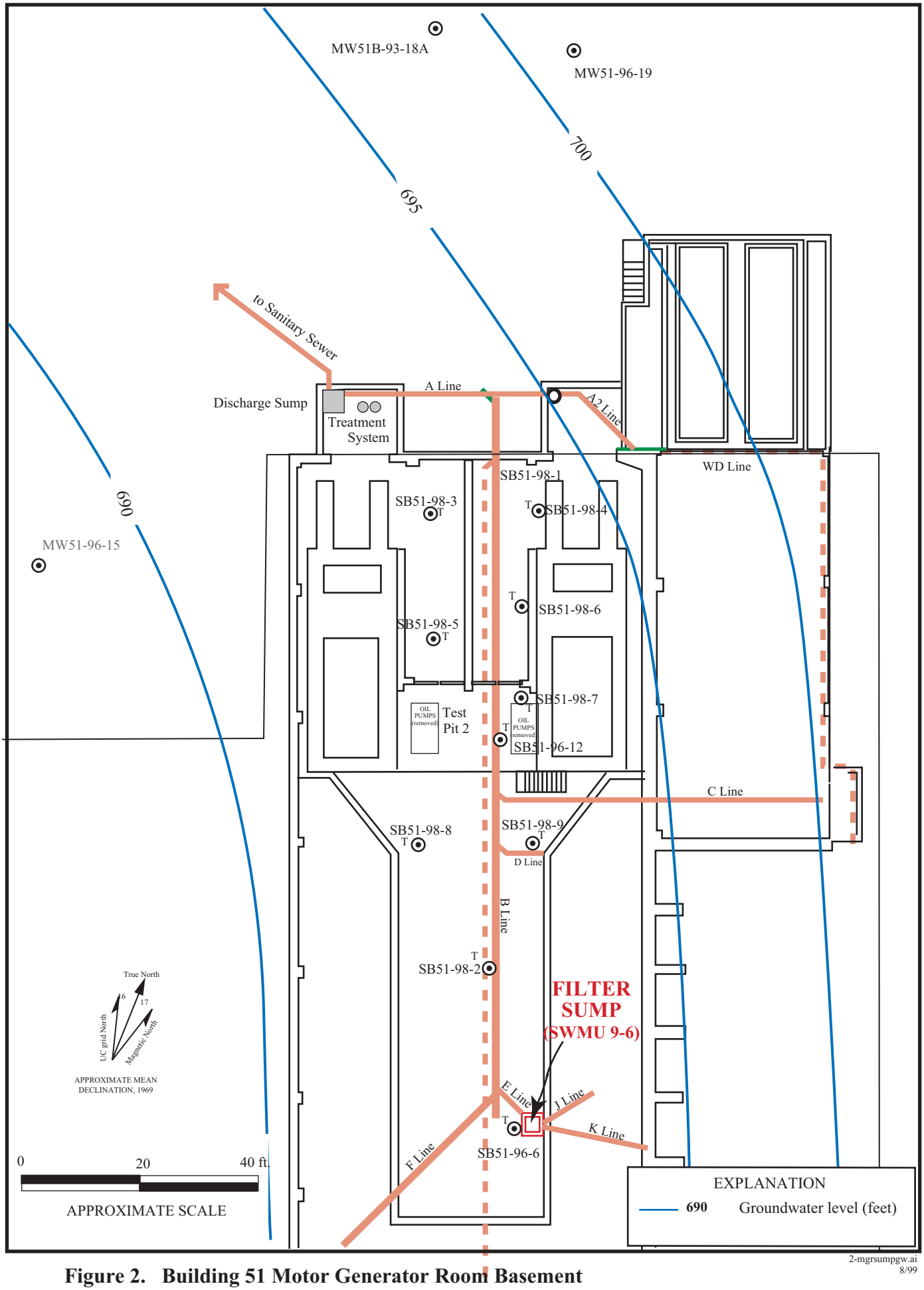
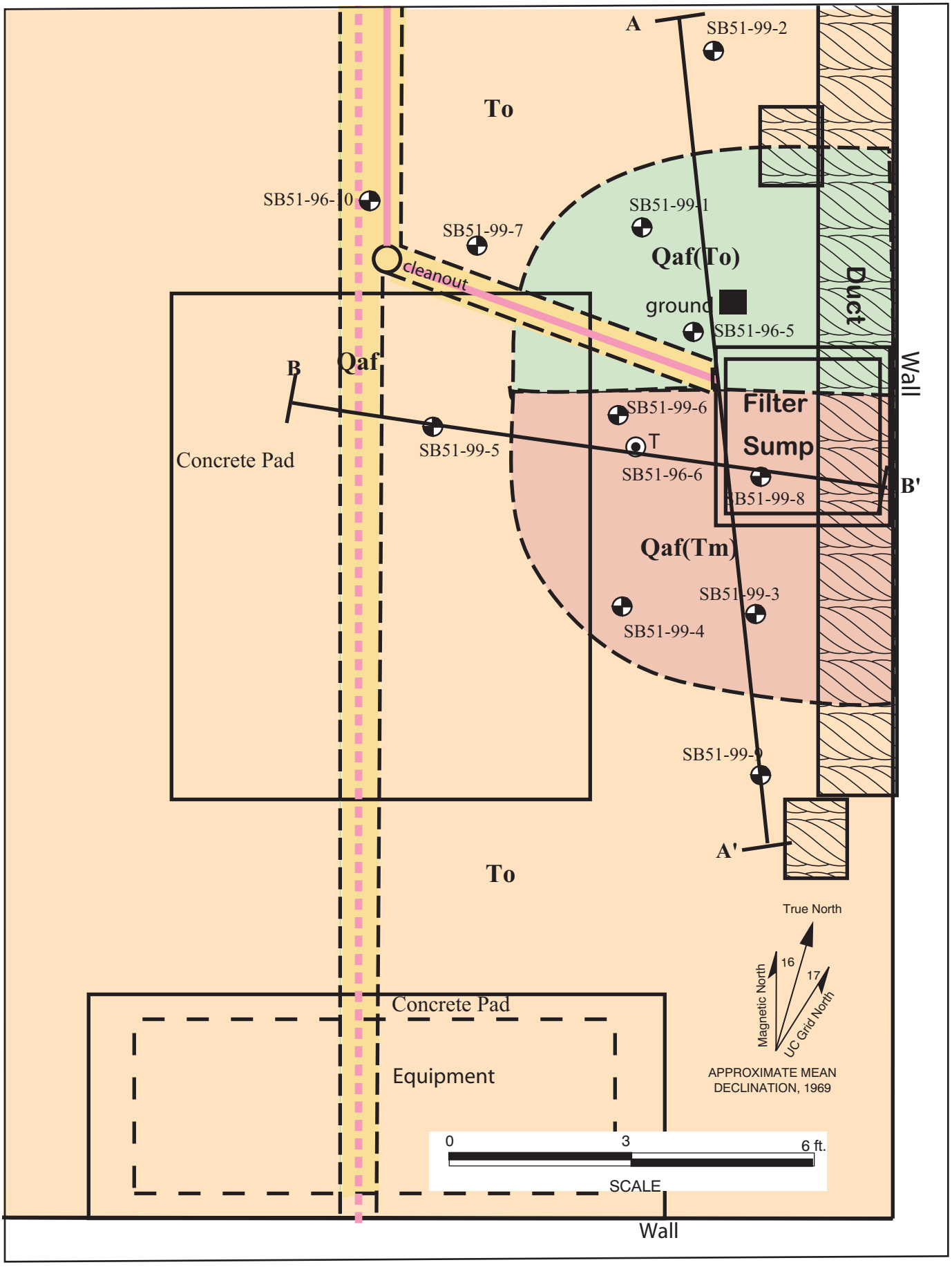
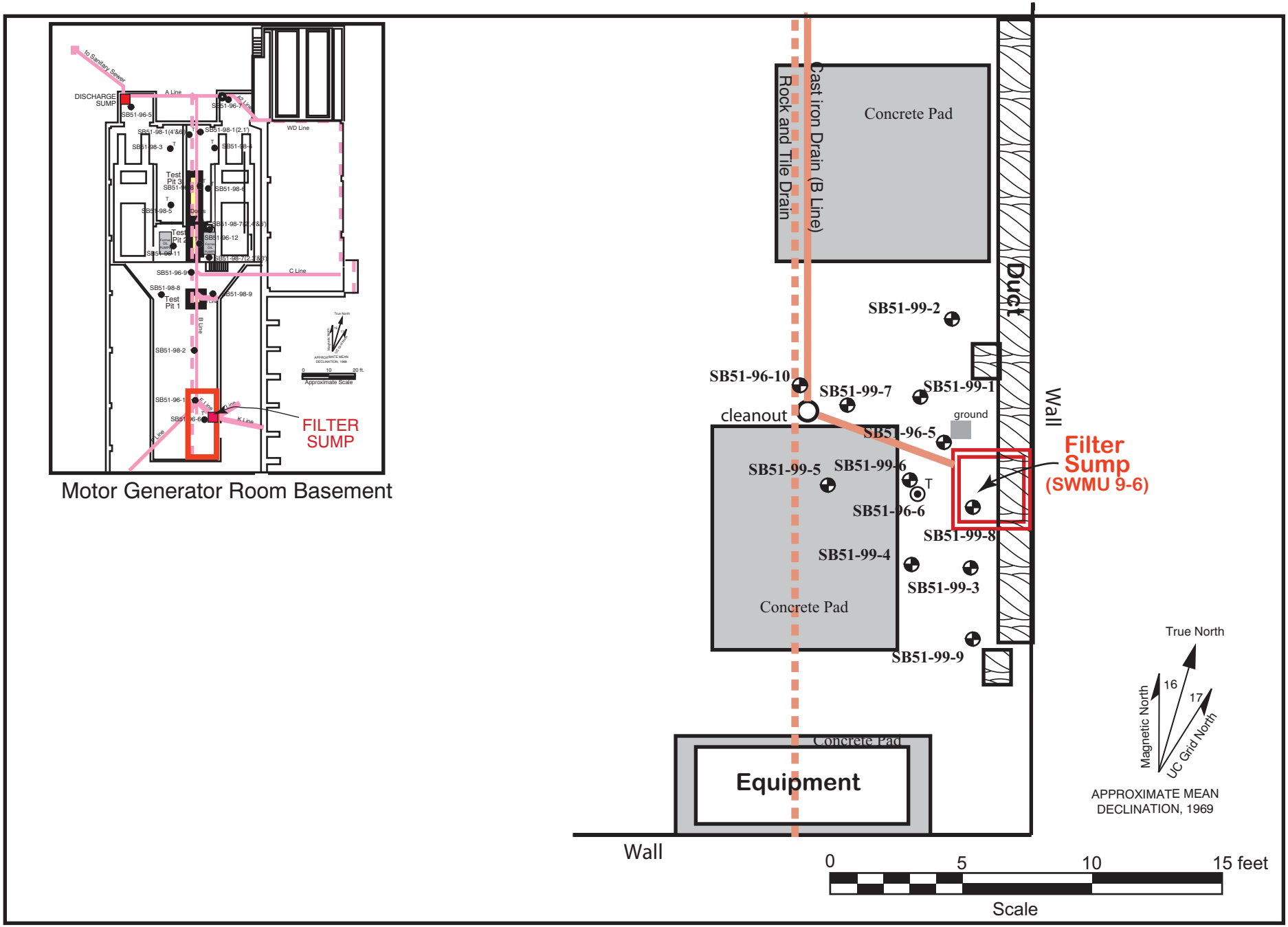


Figure 2. Building 51 Motor Generator Room Basement



3-Filter sumpgeology.ai
7/99

Figure 3. Surficial Geology - Motor Generator Room Basement Filter Sump.



4-fssamploc..ai
8/99

Figure 4. Locations of Soil Borings, Motor Generator Room Basement Filter Sump.

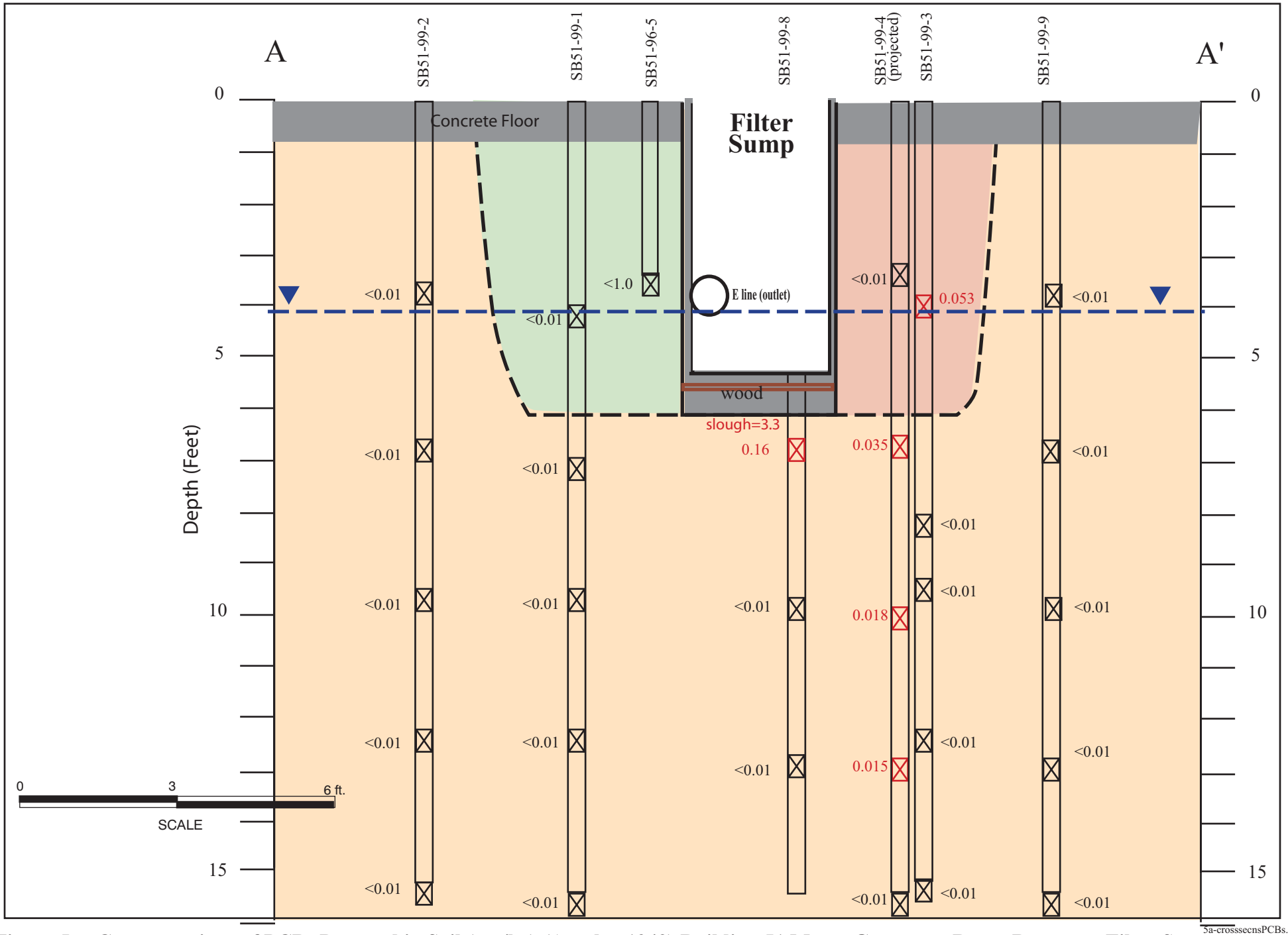


Figure 5a. Concentrations of PCBs Detected in Soil (mg/kg) (Aroclor 1242) Building 51 Motor Generator Room Basement Filter Sump Cross Section AA'

5a-crosssecnsPCBs.ai
7/99

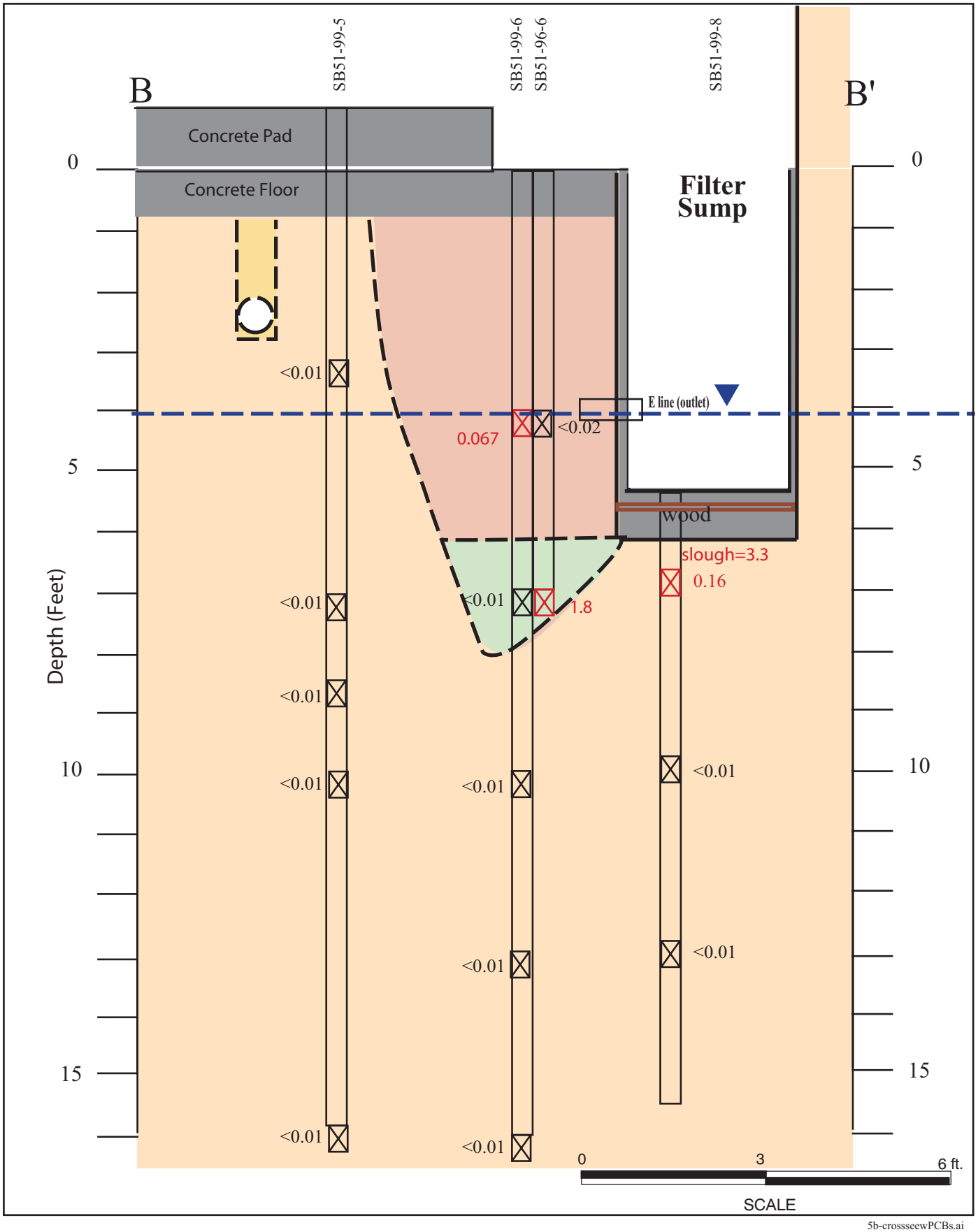


Figure 5b. Concentrations of PCBs Detected in Soil (mg/kg) (Aroclor-1242)
Building 51 Motor Generator Room Basement Filter Sump Cross Section BB'

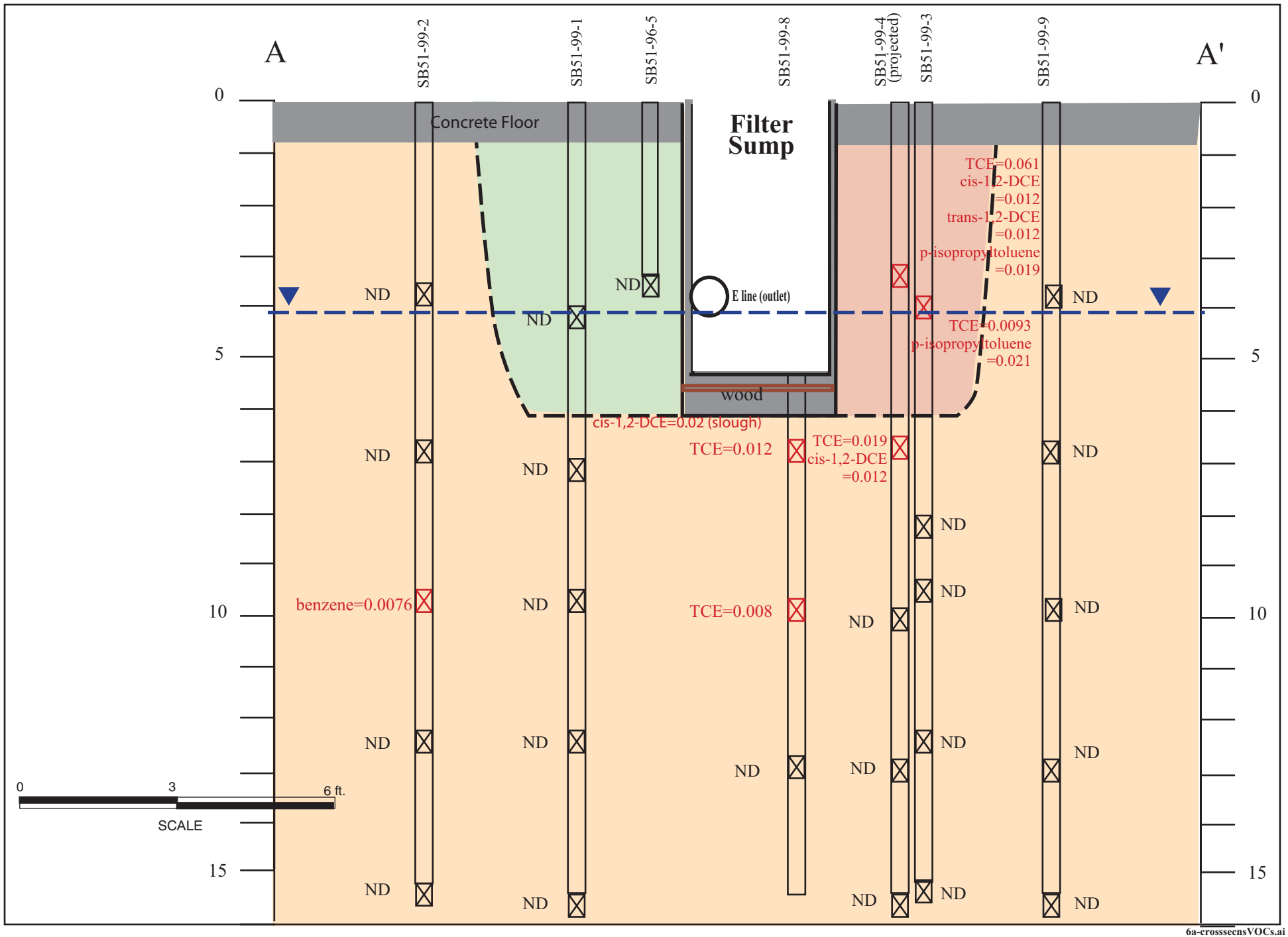
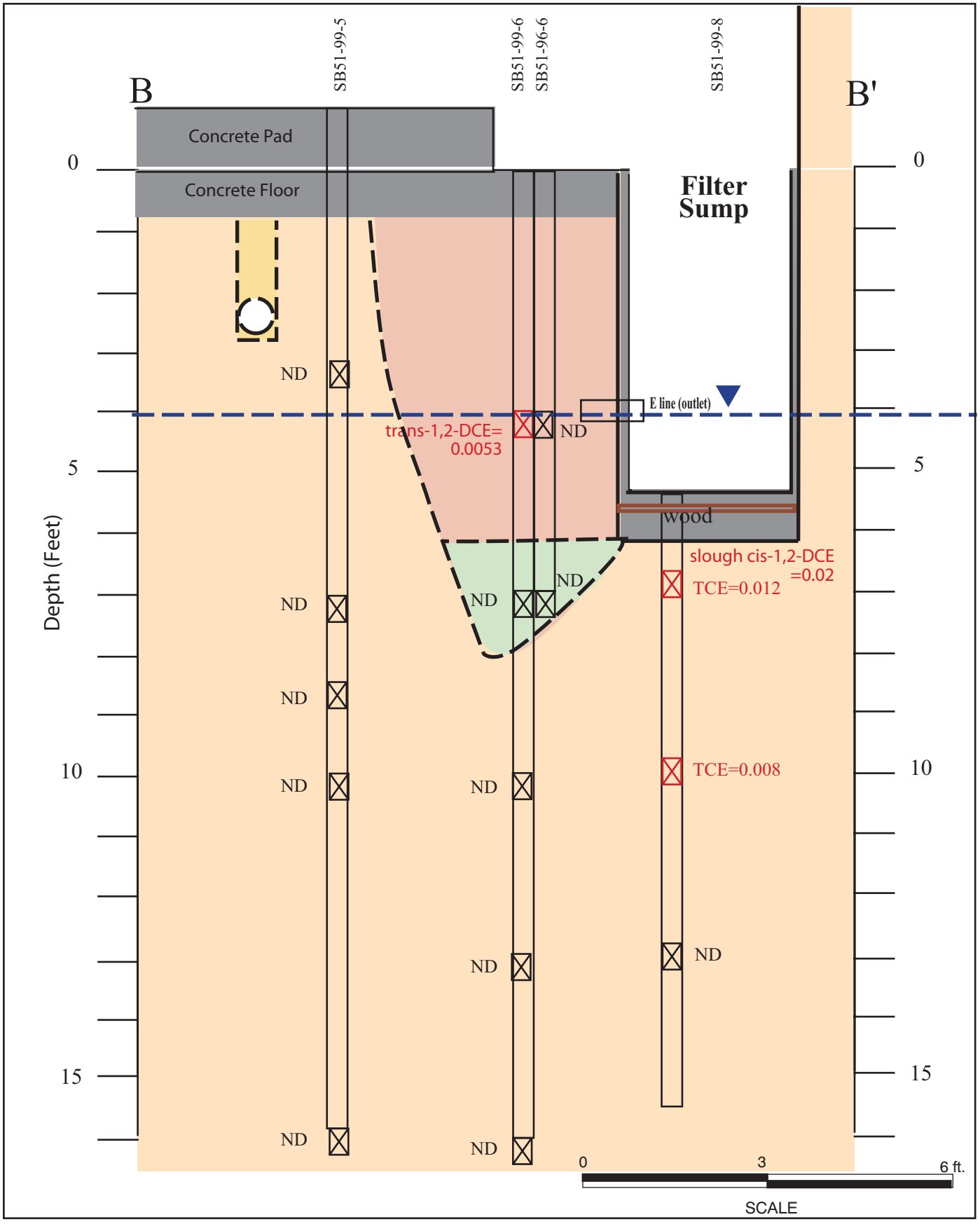
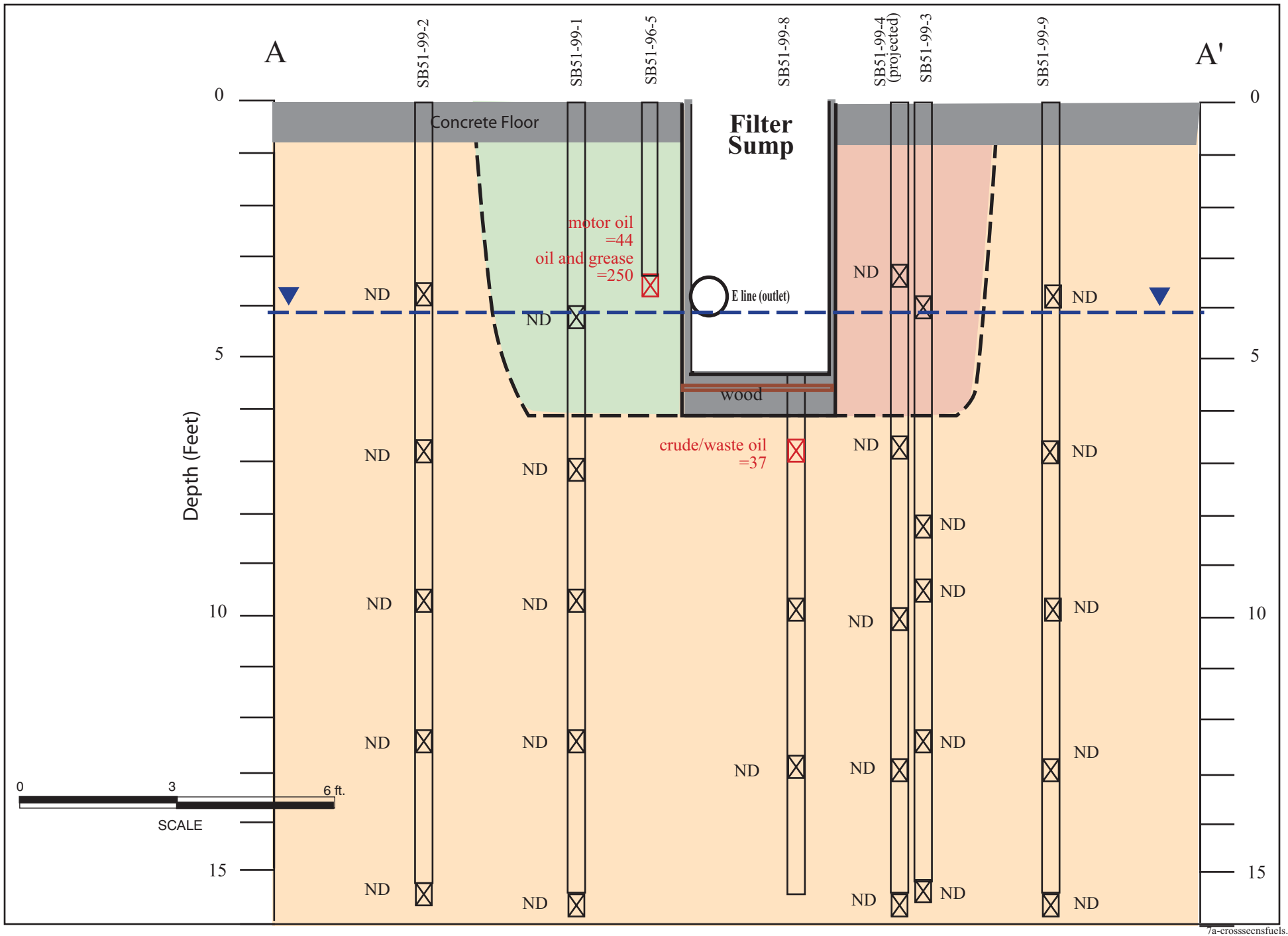


Figure 6a. Concentrations of VOCs Detected in Soil (mg/kg) Building 51 Motor Generator Room Basement Filter Sump Cross Section AA'



6b-crosssecewVOCss.ai
7/99

Figure 6b. Concentrations of VOCs Detected in Soil (mg/kg)
Building 51 Motor Generator Room Basement Filter Sump Cross Section BB'



7a-crosssecnsfuels.a
8/99i

Figure 7a. Concentrations of Fuels Detected in Soil (mg/kg) Building 51 Motor Generator Room Basement Filter Sump Cross Section AA'

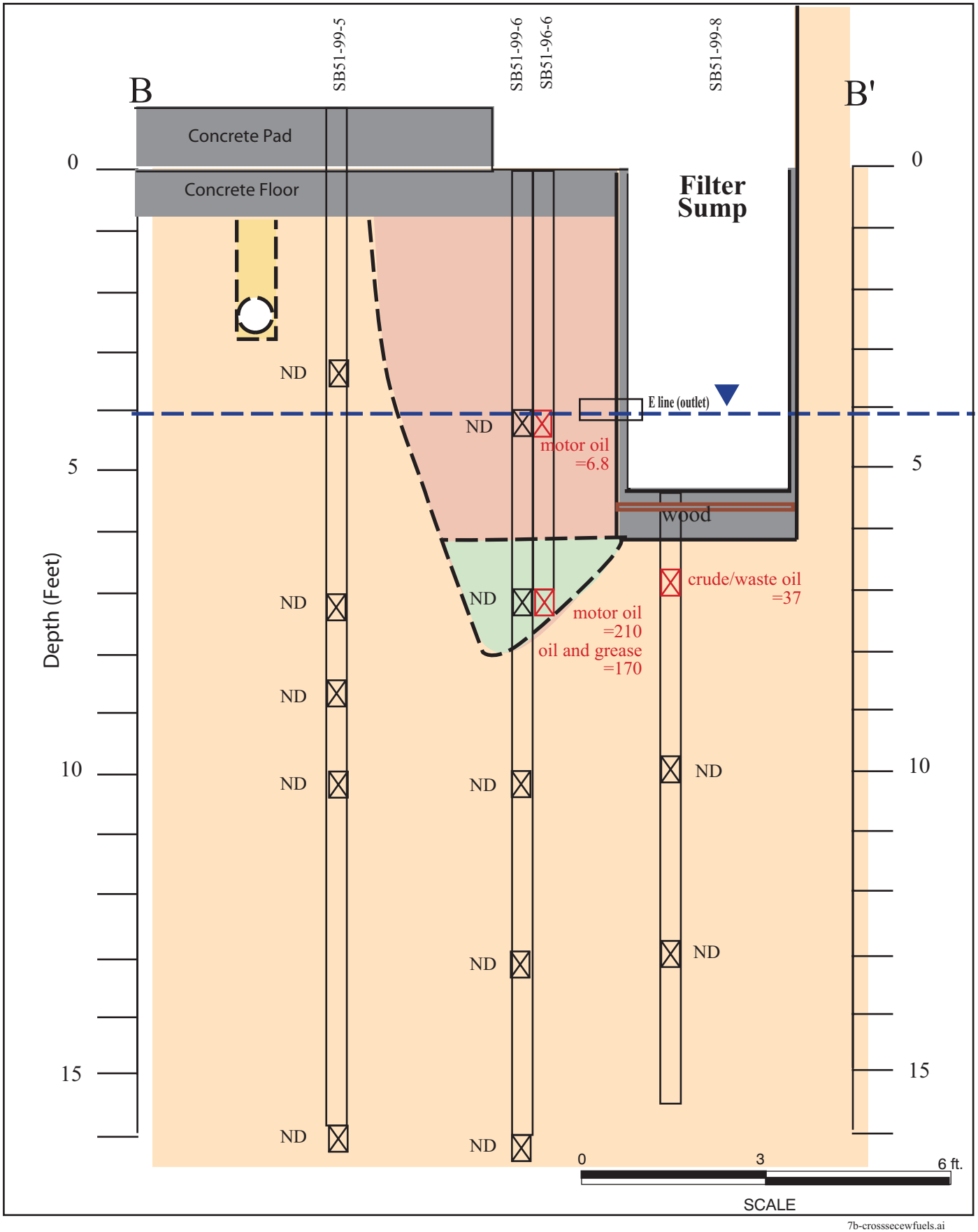


Figure 7b. Concentrations of Fuels Detected in Soil (mg/kg)
Building 51 Motor Generator Room Basement Filter Sump Cross Section BB'

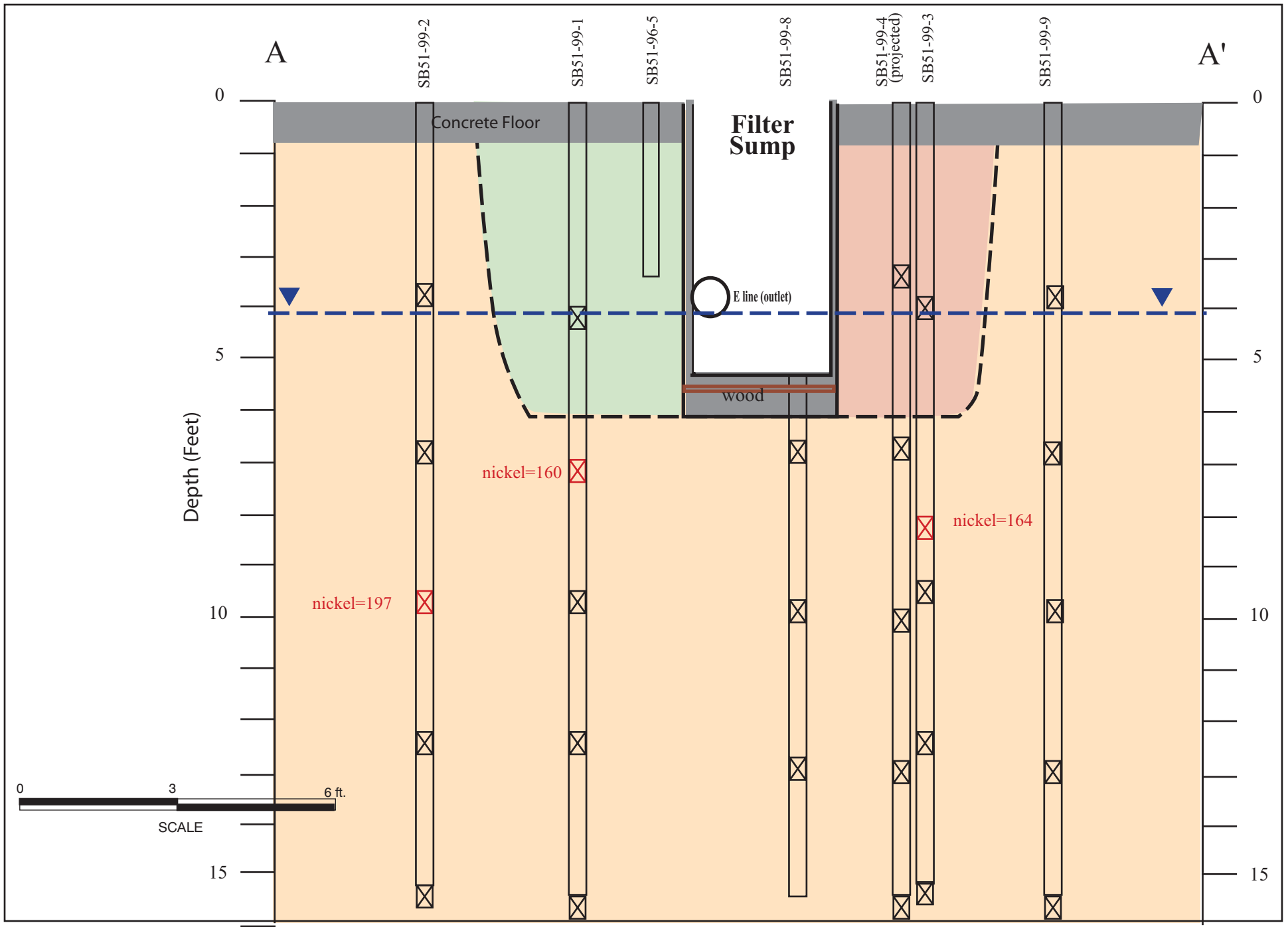


Figure 8a. Concentrations of Metals Detected in Soil above Background and PRGs for Residential Soil (mg/kg)
Building 51 Motor Generator Room Basement Filter Sump Cross Section AA'

8a-crosssecnsfuels.ai
7/99

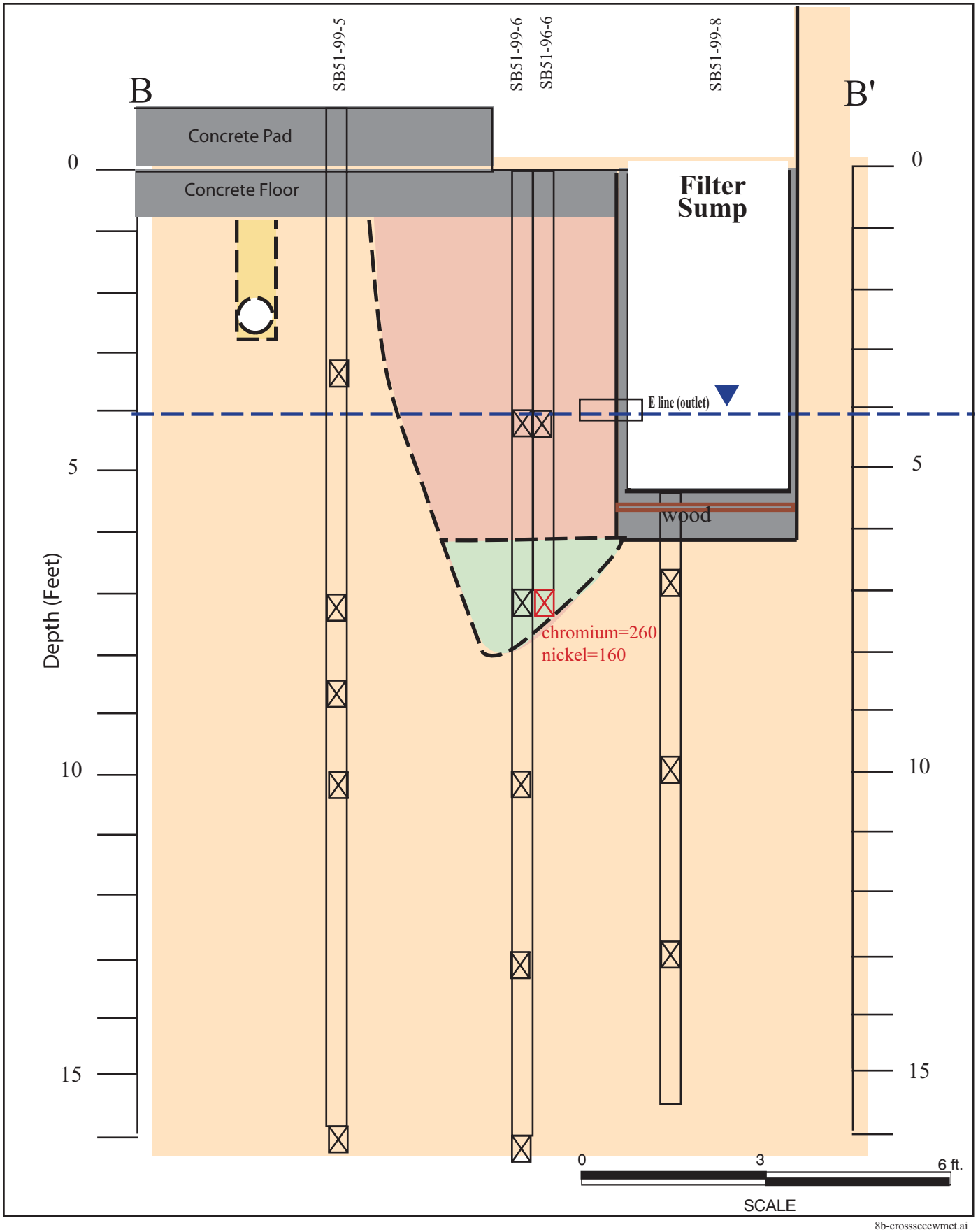


Figure 8b. Concentrations of Metals Detected in Soil above Background and PRGs for Residential Soil (mg/kg)
Building 51 Motor Generator Room Basement Filter Sump Cross Section BB'

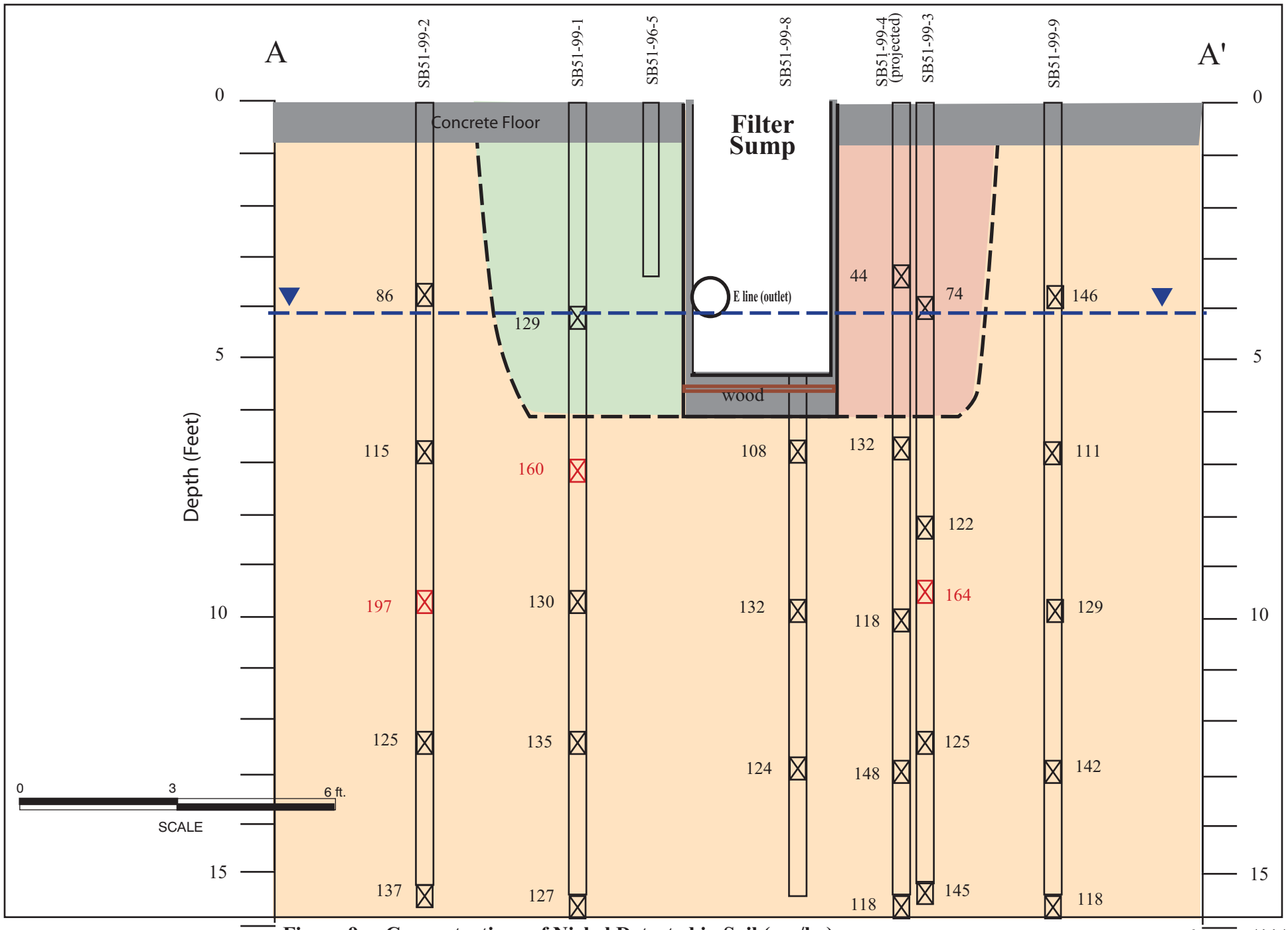


Figure 9a. Concentrations of Nickel Detected in Soil (mg/kg)
Building 51 Motor Generator Room Basement Filter Sump Cross Section AA'

9a-crosssecnsnickel.ai
7/99

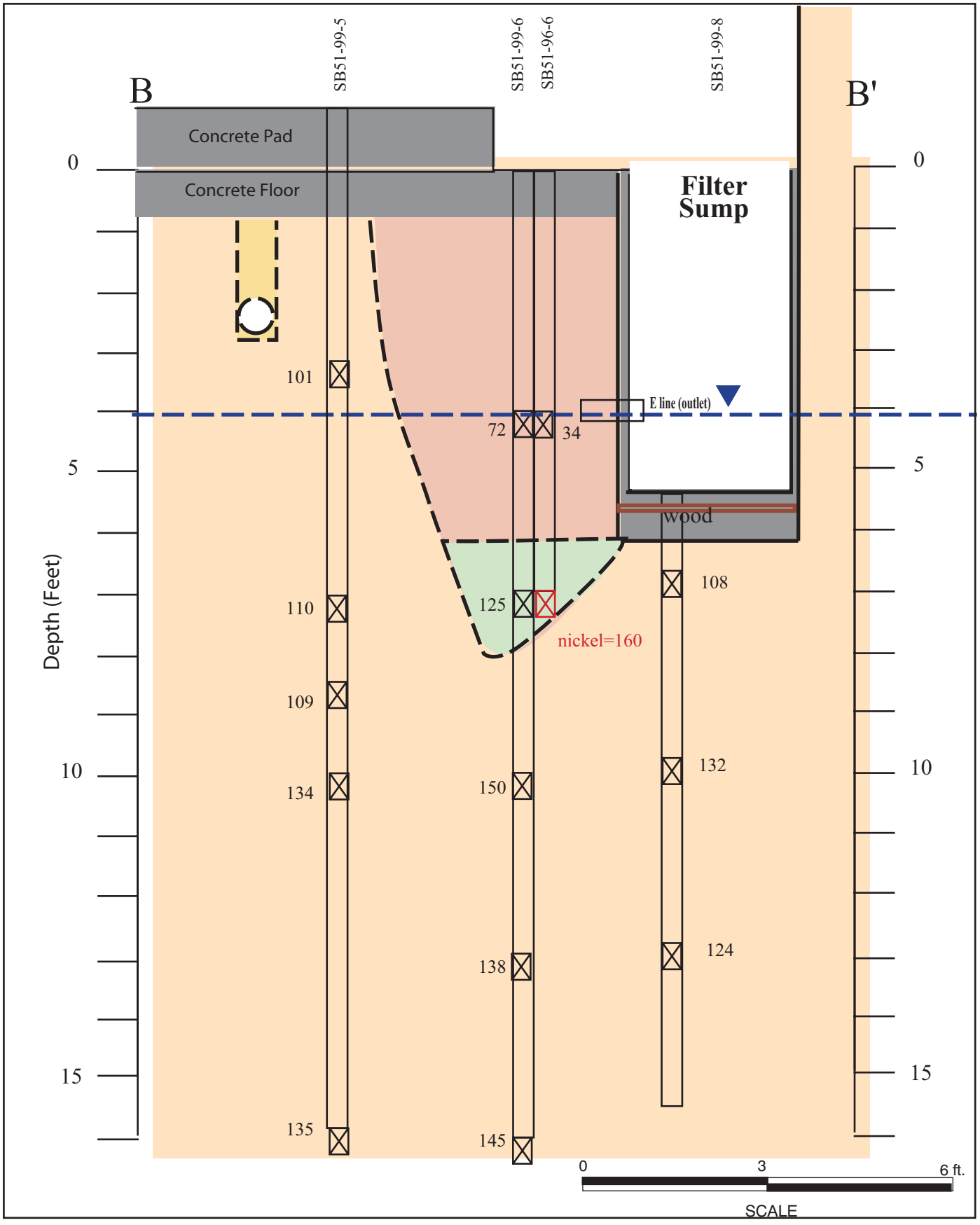


Figure 9b. Concentrations of Nickel Detected in Soil (mg/kg)
Building 51 Motor Generator Room Basement Filter Sump Cross Section BB''

LIST OF TABLES

Table 1A
Soil Sampling Results
Organics, PCBs, and Fuels

Unit/Area	Location	Sample ID	Date	Lab	8260 mg/kg	PCB mg/kg	TPH-Fuel Fingerprint mg/kg	Oil&Grease mg/kg
SWMU 9-6	SB51-96-5	BS-SB51-96-5-4	Apr-96	CLS	ND	<1.0	Motor Oil=44	250
	SB51-96-6	BS-SB51-96-6-4	Apr-96	CLS	ND	<0.02	Motor Oil=6.8	<10
		BS-SB51-96-6-7			ND	Aroclor 1242=1.8	Motor Oil=210	170
	SB51-99-1	BS-SB51-99-1-4	Jun-99	BC	ND	<0.01	ND	<20
		BS-SB51-99-1-6.9			ND	<0.01	ND	<20
		BS-SB51-99-1-9.4			ND	<0.01	ND	<20
		BS-SB51-99-1-12.3			ND	<0.01	ND	<20
		BS-SB51-99-1-15.5			ND	<0.01	ND	<20
	SB51-99-2	BS-SB51-99-2-3.4	Jun-99	BC	ND	<0.01	ND	<20
		BS-SB51-99-2-6.5			ND	<0.01	ND	<20
		BS-SB51-99-2-9.3			Benzene=0.0076	<0.01	ND	<20
	SB51-99-2	BS-SB51-99-2-12.2	Jun-99	BC	ND	<0.01	ND	<20
		BS-SB51-99-2-15.3			ND	<0.01	ND	<20
	SB51-99-3	BS-SB51-99-3-3.8	Jun-99	BC	p-isopropyltoluene=0.021 TCE=0.0093	PCB 1242 = 0.053	ND	<20
		BS-SB51-99-3-8			ND	<0.01	ND	<20
		BS-SB51-99-3-9.3			ND	<0.01	ND	<20
		BS-SB51-99-3-12.3			ND	<0.01	ND	<20
		BS-SB51-99-3-15.2			ND	<0.01	ND	<20
	SB51-99-4	BS-SB51-99-4-3.3	Jun-99	BC	cis-1,2-DCE=0.012 trans-1,2-DCE=0.012 p-isopropyltoluene=0.019 TCE=0.061	<0.01	ND	<20
		BS-SB51-99-4-6.5			cis-1,2-DCE=0.012 TCE=0.019	PCB 1242 = 0.035	ND	<20
		BS-SB51-99-4-9.7			ND	PCB 1242 = 0.018	ND	<20
		BS-SB51-99-4-12.7			ND	PCB 1242 = 0.015	ND	<20
		BS-SB51-99-4-15.5			ND	<0.01	ND	<20
	SB51-99-5	BS-SB51-99-5-4.3	Jun-99	BC	ND	<0.01	ND	<20
		BS-SB51-99-5-8			ND	<0.01	ND	<20
		BS-SB51-99-5-11			ND	<0.01	ND	<20
		BS-SB51-99-5-14			ND	<0.01	ND	<20
		BS-SB51-99-5-17			ND	<0.01	ND	<20

Table 1A (Cont'd)
Soil Sampling Results
Organics, PCBs, and Fuels

Unit/Area	Location	Sample ID	Date	Lab	8260 mg/kg	PCB mg/kg	TPH-Fuel Fingerprint mg/kg	Oil&Grease mg/kg
SWMU 9-6	SB51-99-6	BS-SB51-99-6-4	Jun-99	BC	trans-1,2-DCE=0.0053	PCB 1242 = 0.067	Crude/Waste Oil=57	<20
		BS-SB51-99-6-7			ND	<0.01	ND	<20
		BS-SB51-99-6-10			ND	<0.01	ND	<20
		BS-SB51-99-6-13			ND	<0.01	ND	<20
		BS-SB51-99-6-16			ND	<0.01	ND	<20
	SB51-99-7	BS-SB51-99-7-4.3	Jun-99	BC	ND	<0.01	ND	<20
		BS-SB51-99-7-6.5			ND	<0.01	ND	<20
		BS-SB51-99-7-9.7			ND	<0.01	ND	<20
		BS-SB51-99-7-12.4			ND	<0.01	ND	<20
		BS-SB51-99-7-15.5			ND	<0.01	ND	<20
	SB51-99-8	BS-SB51-99-8-7.1	Jun-99	BC	TCE=0.012	PCB 1242 = 0.16	Crude/Waste Oil=37	<20
		BS-SB51-99-8-10.1			TCE=0.0079	<0.01	ND	<20
		BS-SB51-99-8-13.1			ND	<0.01	ND	<20
		BS-SB51-99-8-16.1			cis-1,2-DCE=0.020	PCB 1242 = 3.3	ND	<20
	SB51-99-9	BS-SB51-99-9-4.1	Jun-99	BC	ND	<0.01	ND	<20
		BS-SB51-99-9-7.1			ND	<0.01	ND	<20
		BS-SB51-99-9-10.1			ND	<0.01	ND	<20
		BS-SB51-99-9-13.1			ND	<0.01	ND	<20
		BS-SB51-99-9-16.1			ND	<0.01	ND	<20

BC = Analysis by BC Laboratories
CLS = Analysis by California Laboratory Services

< = Less than Quantitation Limit
ND = Not detected

Table 1B
Soil Sampling Results
Detected Metals
(Concentrations in mg/kg)

					Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Vn	Zn
DETECTION LIMIT (BC)					10	1	1	1	2	1	0.1	5	1	10	0.2	5	5	1	2	10	1	5
Maximum Background Concentrations**					5.5	19.1	323.6	1.0	2.7	99.6		22.2	69.4	16.1	0.4	7.4	119.8	5.6	1.8	7.6	74.3	106.1
USEPA Region 9 PRGs					30	0.38	5200	150	37	210	30	3300	2800	400	22	370	1500	370	370	6	520	22000
California Modified PRGs									9		0.2*			130			150					
Unit/Area	Location	Sample ID	Date	LAB																		
SWMU 9-6	SB51-96-6	BS-SB51-96-6-4	Apr-96	CLS		0.65	120	0.41		78	NA	15	8.4				34				53	50
		BS-SB51-96-6-7				4.2	130	0.8		260	NA	30	89	18	0.065		160				74	190
	SB51-99-1	BS-SB51-99-1-4	Jun-99	BC		4.8	287	1.1		126	NA	16	42	7.6			129	1.3			84	95
		BS-SB51-99-1-6.9				5.4	308			94	NA	16	54	8.3			160				58	90
		BS-SB51-99-1-9.4				12	483	1.2		117	NA	18	27	7.7			130				94	97
		BS-SB51-99-1-12.3				8.8	428	1.1		116	NA	18	27	7.7			135	1.2			74	99
		BS-SB51-99-1-15.5				11	369	1.1		108	NA	19	26	7.2			127	1.3			84	97
	SB51-99-2	BS-SB51-99-2-3.4				13	258			81	NA	12	37				86				61	58
		BS-SB51-99-2-6.5				2.9	255	1.1		102	NA	13	32	5.4			115				68	78
		BS-SB51-99-2-9.3				16	455	1.2		131	NA	23	71	9.1			197	1.5			88	118
		BS-SB51-99-2-12.2				14	436	1.2		110	NA	18	38	7.6			125	1.2			97	99
		BS-SB51-99-2-15.3				12	380	1.1		102	NA	20	30	7.3			137				82	100
	SB51-99-3	BS-SB51-99-3-3.8				3.0	163			65	NA	12	27	5.5			74	1.1			45	56
		BS-SB51-99-3-8				12	342	1.1		102	NA	17	36	7.2			122	1.1			86	95
		BS-SB51-99-3-9.3				2.6	383	1.1		117	NA	19	40	7.2			164	1.4			75	94
		BS-SB51-99-3-12.3				11	433			97	NA	17	28	7.2			125				80	94
		BS-SB51-99-3-15.2				7.4	383			94	NA	19	44	6.9			145	1.4			65	107
	SB51-99-4	BS-SB51-99-4-3.3				1.4	132			55	NA	13	19				44				34	43
		BS-SB51-99-4-6.5				9.5	425	1.0		113	NA	19	50	7.6			132	1.5			87	100
		BS-SB51-99-4-9.7				11	372	1.1		108	NA	17	27	6.7			118				96	89
		BS-SB51-99-4-12.7				11	428	1.2		122	NA	22	30	7.7			148	1.4			109	115
		BS-SB51-99-4-15.5				13	3.9	1.1		93	NA	16	42	7.1			118	1.2			73	88
	SB51-99-5	BS-SB51-99-5-4.3				3.9	380	1.0		76	NA	11	27	5.5			101				35	69
		BS-SB51-99-5-8				14	330			78	NA	14	260	5.2			110				44	84
		BS-SB51-99-5-11				13	358			84	NA	13	24	6.0			109				55	75
		BS-SB51-99-5-14				12	359			103	NA	20	30	7.5			134	1.4			80	95
		BS-SB51-99-5-17				12	402			106	NA	20	26	7.6			135				84	99
	SB51-99-6	BS-SB51-99-6-4				4.0	111			67	NA	17	67	29	0.76		72				58	72
		BS-SB51-99-6-7				12	112			85	NA	19	32	5.9			125				64	88
		BS-SB51-99-6-10				8.2	317			120	NA	18	45	7.2			150				64	105
		BS-SB51-99-6-13				11	390			102	NA	20	38	7.2			138				73	102
		BS-SB51-99-6-16				12	409			106	NA	21	40	8.2			145				78	109

Table 1B (Cont'd)
Soil Sampling Results
Detected Metals
(Concentrations in mg/kg)

					Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Ti	Vn	Zn
		DETECTION LIMIT (BC)			10	1	1	1	2	1	0.1	5	1	10	0.2	5	5	1	2	10	1	5
		Maximum Background Concentrations**			5.5	19.1	323.6	1.0	2.7	99.6		22.2	69.4	16.1	0.4	7.4	119.8	5.6	1.8	7.6	74.3	106.1
		USEPA Region 9 PRGs			30	0.38	5200	150	37	210	30	3300	2800	400	22	370	1500	370	370	6	520	22000
		California Modified PRGs							9		0.2*			130			150					
Unit/Area	Location	Sample ID	Date	LAB																		
SWMU 9-6	SB51-99-7	BS-SB51-99-7-4.3	Jun-99	BC		4.6	269	1.2		96	NA	9.7	24				95				57	65
		BS-SB51-99-7-6.5				8.5	313			105	NA	14	59	18			115	12			75	80
		BS-SB51-99-7-9.7				9.1	331			119	NA	15	79	33	0.71		120	22			100	90
		BS-SB51-99-7-12.4				7.9	401			125	NA	18	42				149	8.9			88	97
		BS-SB51-99-7-15.5				13	385			117	NA	19	28				139	1.1			83	99
	SB51-99-8	BS-SB51-99-8-7.1				3.1	302			72	NA	12	36				108				42	61
		BS-SB51-99-8-10.1				12	364	1.0		114	NA	18	46				132	1.0			86	99
		BS-SB51-99-8-13.1				11	432			92	NA	18	26				124				89	92
		BS-SB51-99-8-16.1				10	419			113	NA	17	54				134				88	88
	SB51-99-9	BS-SB51-99-9-4.1				2.1	276			82	NA	16	30				146				45	70
		BS-SB51-99-9-7.1					290			73	NA	13	33				111				40	64
		BS-SB51-99-9-10.1				12	456			105	NA	19	27				129				92	96
		BS-SB51-99-9-13.1				12	391			102	NA	19	29				142	1.4			99	104
		BS-SB51-99-9-16.1				7.5	441	1.0		100	NA	13	13				118	1.1			58	89

*This PRG value assumes that detected Cr is 100% CrVI for screening purposes.

**Background concentrations derived from LBL Soil Disposal Plan (LBL, 1992e) and from Shacklette and Borngen (1984). See text for discussion.

BC = Analysis by BC Laboratories

CLS = Analysis by California Laboratory Services

NA	= Not analyzed
	= Not detected
	= Concentration above background or PRG, whichever is greater

Table 2A
Sediment Sampling Results
Organics, PCBs, and Fuels

Unit/Area	Location	Sample ID	Date	Lab	8270 mg/kg	PCB mg/kg	TPH-Fuel Fingerprint mg/kg	TPH-Diesel mg/kg	Oil&Grease mg/kg
SWMU 9-6	B51 Bsmt Filter Sump	SS-51MR-FS-1,2	May-96	CLS		PCB 1242 = 380		<400	45,000
		SS-FS-99-1	May-99	BC	Bis(2-ethylhexyl) phthalate=13 Fluoranthene=3.9 Pyrene=3.9	PCB 1242 = 330	Hydraulic/Motor Oil=45,000		

BC = Analysis by BC Laboratories
CLS = Analysis by California Laboratory Services

= Not analyzed
< = Less than Quantitation Limit

Table 2B
Sediment Sampling Results
Detected Metals
(Concentrations in mg/kg)

					Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Vn	Zn
		DETECTION LIMIT (BC)			10	1	1	1	1	1	0.1	5	1	5	0.2	5	5	1	2	10	1	5
		Maximum Background Concentrations**			5.5	19.1	323.6	1.0	2.7	99.6		22.2	69.4	16.1	0.4	7.4	119.8	5.6	1.8	7.6	74.3	106.1
		USEPA Region 9 PRGs			30	0.38	5200	150	37	210	30	3300	2800	400	22	370	1500	370	370	6	520	22000
		California Modified PRGs							9		0.2*			130			150					
Unit/Area	Location	Sample ID	Date	LAB																		
SWMU 9-6	B51 Bsmt Filter Sump	SS-51MR-FS-1,2	May-96	CLS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	105	NA	NA	NA	NA	NA	NA	NA
		SS-51FS-99-1	May-99	BC		4.2	85		8.7	305	NA	9.3	1600	301	46		17	2.9	2.6		46	369
		(Dried)				14	291		20	1050	NA		5690	1880	196		67	8.9			138	1900

*This PRG value assumes that detected Cr is 100% CrVI for screening purposes.

**Background concentrations derived from LBL Soil Disposal Plan (LBL, 1992e) and from Shacklette and Boerngen (1984). See text for discussion.

NA	= Not analyzed
	= Not detected
	= Concentration above background or PRG, whichever is greater

Table 3
Water Sampling Results
Organics, PCBs, and Fuels

Unit/Area	Location	Date	Lab	8260 µg/L	PCBs µg/L	Oil&Grease mg/L
SWMU 9-6	SB51-96-6	Apr-96	CLS		<0.50	
		May-96	CLS			<5.0
		Apr-96	LBL	cis-1,2-DCE=31.2 trans-1,2-DCE=21.5 p-isopropyltoluene=1.2 Tolune=1.3 vinyl chloride=16.7 TCE=40.8		
		Nov-96	LBL	ND		
		Dec-97	LBL	cis-1,2-DCE=3.6 trans-1,2-DCE=4.0 TCE=1.1		
	B51 Filter Sump	Apr-99	BC		Aroclor 1242=3600	
	B51 Bsmt K-Line Inflow	May-99	BC		Aroclor 1242=3.4	

= Not analyzed
ND = Not detected

BC = Analysis by BC Laboratories
CLS = Analysis by California Laboratory Services

Table 4.

Maximum Concentrations Contaminants Detected in Soil

Building 51 Motor Generator Room Sump (SWMU 9-6)

Contaminants Detected	Concentration (mg/kg)	EPA Region 9 PRG for Residential Soil	Cal-Modified PRG for Residential Soil	Maximum Background Concentration
PCBs (Aroclor 1242)	3.3	0.2		
Metals				
antimony (Sb)	<10	30		5.5
arsenic (As)	16	0.38		19.1
barium (Ba)	483	5200		323.6
beryllium (Be)	1.2	150		1
cadmium (Cd)	<2	37	9	2.7
chromium (Cr)	260	210		99.6
cobalt (Co)	30	3300		22.2
copper (Cu)	260	2800		69.4
lead (Pb)	33	400	130	16.1
mercury (Hg)	0.76	22		0.4
molybdenum	<5	370		7.4
nickel (Ni)	197	1500	150	119.8
selenium (Se)	22	370		5.6
silver (Ag)	<2	370		1.8
thallium (Tl)	<10	6		7.6
vanadium (V)	109	520		74.3
zinc (Zn)	190	22,000		106.1
VOCs				
trichloroethene (TCE)	0.061	2.7		
cis-1,2-dichloroethene (cis-1,2-DCE)	0.02	42		
trans-1,2-dichloroethene (trans-1,2-DCE)	0.012	62		
Aromatics				
benzene	0.0076	0.62		
p-isopropyltoluene	0.021	NS		
Fuels				
TPH-Motor Oil	210	NS		
TPH-Crude/Waste Oil	57	NS		
Oil & Grease	250	NS		

Concentration above maximum background level and PRG

NS No PRG established

Exhibit 1: Water Jet and Vacuum Trucks.

Exhibit 2: Tank (4000 Gallons) Storing Wastewater Generated from Clean-up Activities.